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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/064,829	08/21/2002	Chellappa Balan	124719	9788

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EXAMINER	
DOVE, TRACY MAE	
ART UNIT	**PAPER NUMBER**
1745	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/064,829	BALAN, CHELLAPPA	
	Examiner	Art Unit	
	Tracy Dove	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the communication filed on 3/16/07. Applicant's arguments have been considered, but are not persuasive. Claims 1-14 are pending. This Action is FINAL, as necessitated by amendment.

Claims Analysis

The limitation "to allow a flow of a fluid from the upper channels through the lower channels" in claims 1 and 7 is not given patentable weight because the claims are directed toward an apparatus.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1 and 7 have been amended to recite "wherein the cooling apparatus is not configured to be a fuel cell electrode" and "not configured to be the fuel cell electrode", respectively. These added limitations do not appear to be supported by the specification as filed. A negative limitation must find proper support in the specification. Examiner requests Applicant point out the section of the specification that supports the added limitation of claims 1 and 7.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 5, 7-9 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Nelson, US 6,689,500.

Nelson teaches a fuel cell system that includes fuel cells and cooling elements distributed among the fuel cells. Each fuel cell includes an anode element, a cathode element and an associated electrolytic member sandwiched between the anode and cathode elements (1:52-61). The fuel cell stack includes a cathode plate and an anode plate. The cathode plate has a cathode reactant surface and a cathode cooling surface opposite the cathode reactant surface. The anode plate has an anode reactant surface and an anode cooling surface opposite the anode reactant surface. The cathode plate (base plate) includes a passthrough (cavity) opening from the cooling channel (lower channels) or the cathode cooling surface to the cathode reactant surface (upper channels) (2:17-37). Figures 6A and 6B depict the reactant surface of the cathode plate and Figure 6C depicts the cooling surface of the cathode plate. As shown in Figures 6A-6C the reactant surface channels are parallel to the cooling surface channels of the cathode plate. The passthrough 68 connects the cooling channel (2:31-33) to the reactant channels 28 of the cathode plate (Figure 4 and 6:47-54). Nelson teaches PEM fuel cells (5:14-30).

Thus the claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson, US 6,689,500 in view of Kusunoki et al., US 5,789,094, and further as evidenced by the present specification, [0014].

Nelson teaches a fuel cell system that includes fuel cells and cooling elements distributed among the fuel cells. Each fuel cell includes an anode element, a cathode element and an associated electrolytic member sandwiched between the anode and cathode elements (1:52-61). The fuel cell stack includes a cathode plate and an anode plate. The cathode plate has a cathode reactant surface and a cathode cooling surface opposite the cathode reactant surface. The anode plate has an anode reactant surface and an anode cooling surface opposite the anode reactant surface. The cathode plate (base plate) includes a passthrough (cavity) opening from the cooling channel (lower channels) or the cathode cooling surface to the cathode reactant surface (upper channels) (2:17-37). Figures 6A and 6B depict the reactant surface of the cathode plate and Figure 6C depicts the cooling surface of the cathode plate. As shown in Figures 6A-6C the reactant surface channels are parallel to the cooling surface channels of the cathode plate. The passthrough 68 connects the cooling channel (2:31-33) to the reactant channels 28 of the cathode plate (Figure 4 and 6:47-54). Nelson teaches PEM fuel cells (5:14-30).

Nelson does not explicitly state the material of the cathode plate.

However, Kusunoki teaches fuel cells having oxidant gas flow and fuel gas flow may have flow plates made of copper, nickel and/or stainless steel (16:29-59).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated use the stainless steel plate of Kusunoki for the cathode plate of Nelson because stainless steel is commonly used for plates of fuel cells. Furthermore, the instant specification states the materials of claims 6 and 14 are "typically" used for fuel cell plates (0014).

*

Claims 3, 4, 6, 10-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nelson, US 6,689,500 in view of Bunker, US 7,022,429.

Nelson teaches a fuel cell system that includes fuel cells and cooling elements distributed among the fuel cells. Each fuel cell includes an anode element, a cathode element and an associated electrolytic member sandwiched between the anode and cathode elements (1:52-61). The fuel cell stack includes a cathode plate and an anode plate. The cathode plate has a cathode reactant surface and a cathode cooling surface opposite the cathode reactant surface. The anode plate has an anode reactant surface and an anode cooling surface opposite the anode reactant surface. The cathode plate (base plate) includes a passthrough (cavity) opening from the cooling channel (lower channels) or the cathode cooling surface to the cathode reactant surface (upper channels) (2:17-37). Figures 6A and 6B depict the reactant surface of the cathode plate and Figure 6C depicts the cooling surface of the cathode plate. As shown in Figures 6A-6C the reactant surface channels are parallel to the cooling surface channels of the cathode plate. The

passthrough 68 connects the cooling channel (2:31-33) to the reactant channels 28 of the cathode plate (Figure 4 and 6:47-54). Nelson teaches PEM fuel cells (5:14-30).

Nelson does not explicitly state the channels have a plurality of concavities disposed on a surface portion.

However, Bunker teaches a fuel cell having a plurality of concavities disposed on at least one of a thermal management and electrolytic sections so as to cause hydrodynamic interactions and affect the heat transfer rate between a fluid and the concavities when the fluid is disposed over the concavities (abstract). See Figures 3-6. The electrolytic section comprises an anode 190, a cathode 200 and an electrolyte 210. The thermal management section includes an oxidant section 150 and a fuel section 160. The oxidant and fuel section may be made of sheet metal such as stainless steel sheet metal (5:15-17). The concavities are selected from depressions, indentations, dimples or pits (claim 8).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because the plurality of concavities disposed on at least one of a thermal management and electrolytic sections, as disclosed by Bunker, could have been used for the fuel cell cooling elements and/or electrode surfaces of Nelson to improve hydrodynamic interactions and affect the heat transfer rate between a fluid and the concavities when the fluid is disposed over the concavities. One of skill would have found it obvious to use the concavities of Bunker on any fuel cell having thermal management and/or electrolytic sections so as to cause hydrodynamic interactions and affect the heat transfer rate between a fluid and the concavities when the fluid is disposed over the concavities

Response to Arguments

Applicant's arguments filed 3/16/07 have been fully considered but they are not persuasive.

Regarding Nelson, Applicant argues the reference does not teach parallel upper and lower channels or a parallel flow of a fluid from an upper channel through a lower channel, where the channels do not form a part of the fuel cell electrode. Examiner disagrees with Applicant's analysis of the Nelson reference. Nelson teaches a fuel cell system that includes fuel cells and cooling elements distributed among the fuel cells. Each fuel cell includes an anode element, a cathode element and an associated electrolytic member sandwiched between the anode and cathode elements (1:52-61). The fuel cell stack includes a cathode plate and an anode plate. The cathode plate has a cathode reactant surface and a cathode cooling surface opposite the cathode reactant surface. The anode plate has an anode reactant surface and an anode cooling surface opposite the anode reactant surface. Nelson clearly teaches the "fuel cell" includes the "anode element" and the "cathode element", which are the fuel cell electrodes. Nelson clearly states the cooling elements (cathode plate and anode plate with cooling surfaces) are between the fuel cells. Therefore, the cooling elements (cathode plate and anode plate with cooling surfaces) do not comprise the fuel cell electrodes. The cathode plate (base plate) includes a passthrough (cavity) opening from the cooling channel (lower channels) or the cathode cooling surface to the cathode reactant surface (upper channels) (2:17-37). Figures 6A and 6B depict the reactant surface of the cathode plate and Figure 6C depicts the cooling surface of the cathode plate. As shown in Figures 6A-6C the reactant surface channels are parallel to the cooling surface channels of the cathode plate. The passthrough 68 connects the cooling channel (2:31-33) to the reactant

channels 28 of the cathode plate (Figure 4 and 6:47-54). Thus, the cooling surfaces of Nelson are not an integral part of the fuel cell electrodes. Applicant points out column 6, lines 55-65, which asserted demonstrates the cooling surface and cathode are integral to each other. However, it appears that Applicant does not understand the general workings of a fuel cell. One of skill would have known that the reactant flow channels are not considered an integral part of the fuel cell electrodes. The membrane electrode assembly includes the anode, cathode and electrolyte membrane (the electrodes and membrane). Therefore, Applicant's argument is not persuasive because the cooling surfaces of Nelson are not part of the cathode and/or anode of the fuel cell. The cathode and anode are part of the membrane electrode assembly.

Regarding Jones, Applicant argues it is clear from Fig. 2 in Jones that the passage 140, and therefore passage 140'', is a manifold leading gas to passages 124 (or 124'' in the case of manifold 140'') and not lower and upper channels as wrongly construed by the Examiner. The rejection in view of Jones has been withdrawn.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

June 1, 2007

TRACY DOVE
PRIMARY EXAMINER